

Virtualization

- Server virtualization
- Desktop virtualization

What's in the data room?

Businesses maintain groups of servers on-site to fulfill various business needs including:

- Network Servers / Domain Controllers
- File Storage
- Application Servers (CRM, ERP, Databases, Billing)
- Web Servers (Hosting of web sites and applications)



These servers consume the same resources that any on-site IT resource consumes:

- Space, Power, Cooling, Administrative time, Maintenance Fees, Capex



What's missing from the data room?

- These on-site servers generally need, but do not always get:
 - Fire Suppression
 - Backup Power
 - Failover / Redundant equipment
 - Monitoring
 - 24x7 support

Traditional Server Environments

- One Server for One Application

- File Server



- Web Server



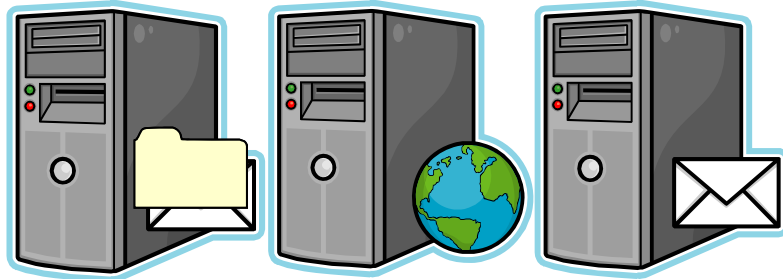
- Mail Server



Server Virtualization Pictorial

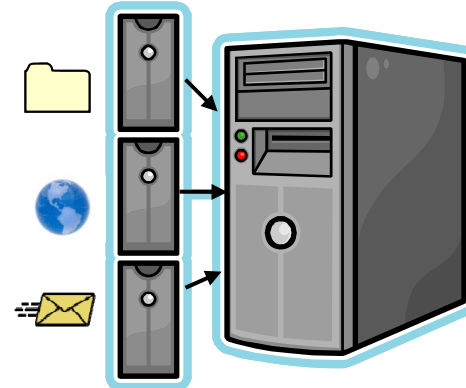
Typical Model:

One Server, One Application



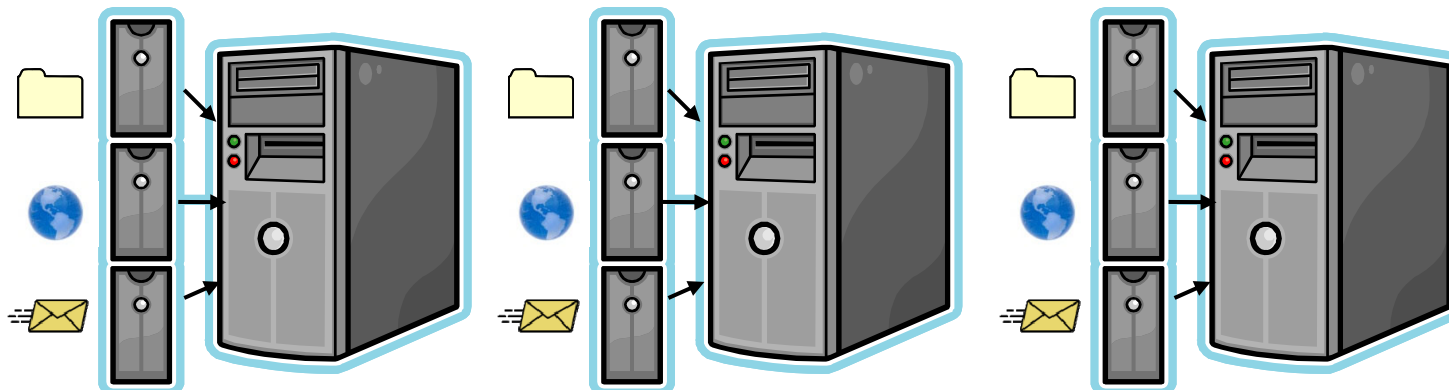
Virtual Machine:

ONE server, Multiple Applications



Virtual Infrastructure:

Multiple Servers, Multiple and REDUNDANT Applications





Traditional Desktop Environments

- Each employee uses a desktop or laptop that IT must maintain.
- Ability to run software is based on the equipment on which it is installed.
- Local disk stores OS, applications and data.
- Upgrades and software are deployed on a one to one basis.

Desktop Virtualization Pictorial

Typical Desktop:

One Desktop, One OS, One Employee



Virtual Desktop:

Access to a single desktop, from any device



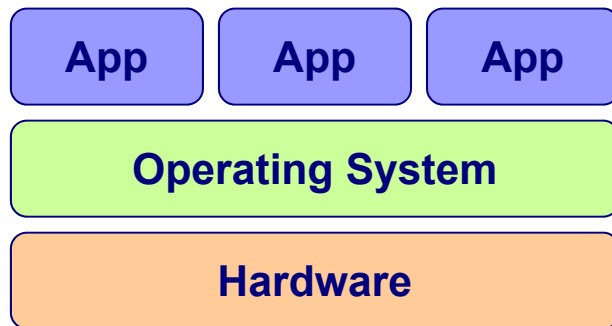


Top Reasons to Consider Desktop

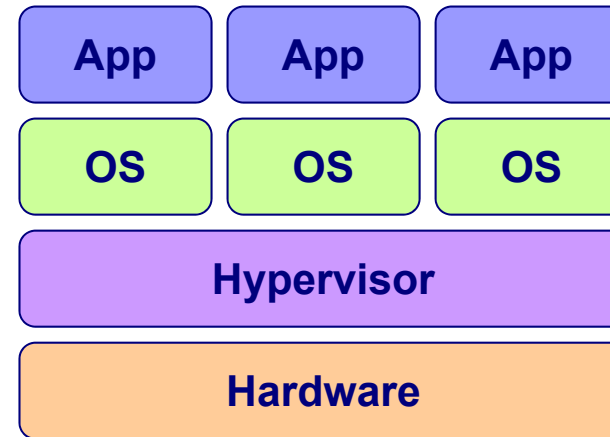
Virtualization

- Economics – Reduce the total cost of desktop ownership by almost 70% through remote troubleshooting, ease of deployment, and extended life of older equipment.
- Productivity – Users can gain access to their desktop from any location on any device, while administrators can support and deploy from a centralized location.
- Scalability – Meet new requirements by adding additional resources to the “virtual” PC rather than upgrading equipment
- Performance – Immediately rectify PC problems by remotely restarting, or reimaging the desktop saving IT time and putting employees back to work immediately.
- Security – Provide external users with secure access to company apps and data. Enforce end-to-end security, consistently, across all users, regardless of device.

Key Technology: Virtualization



Traditional Stack



Virtualized Stack

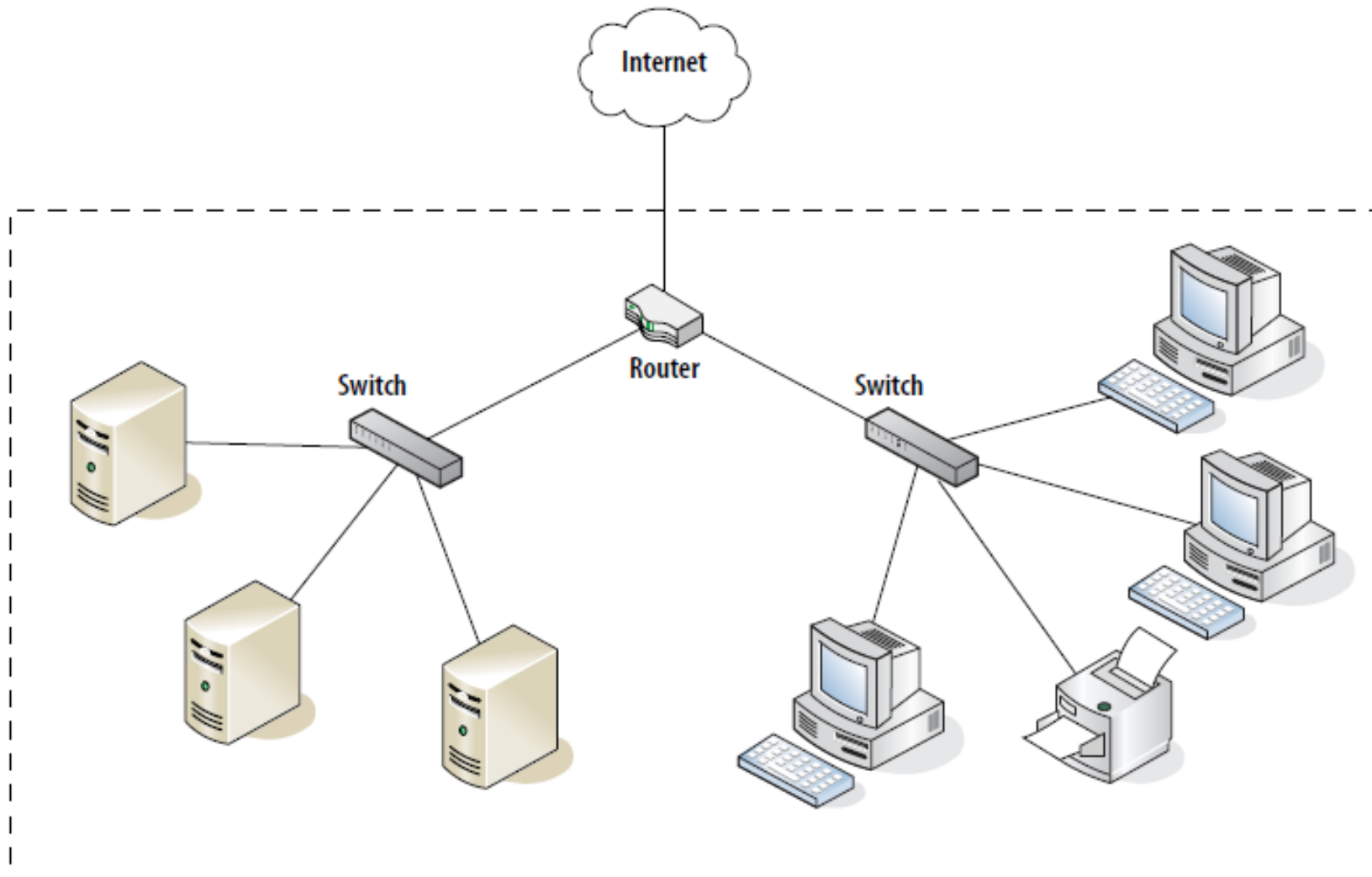
- VmWare ESXi
- Microsoft HyperV
- Citrix XEN



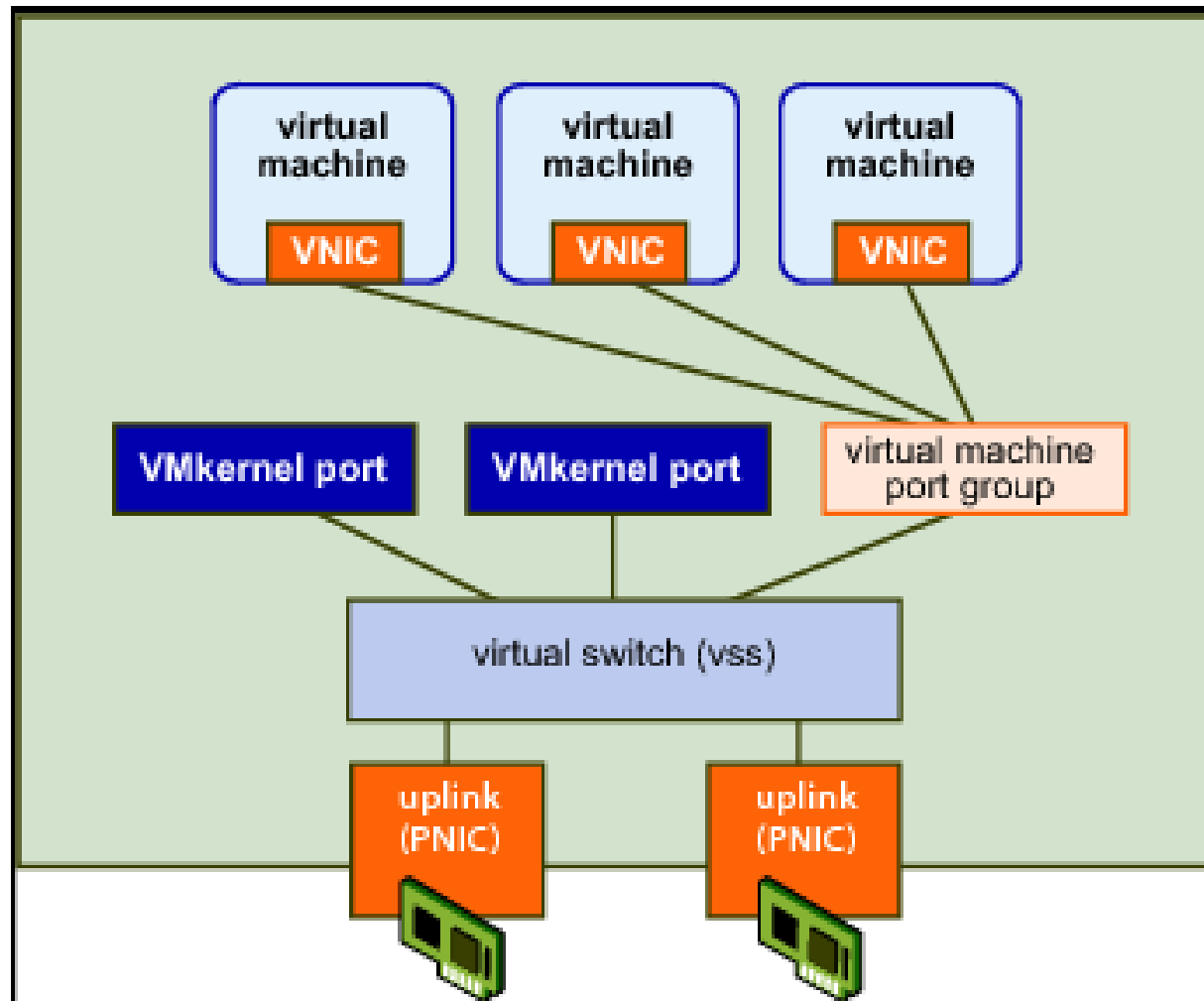
Network Challenges

- Network node count
- Number of hops
- Transport protocol latency
- Network congestion

Traditional data center connectivity



Switching between virtual machines

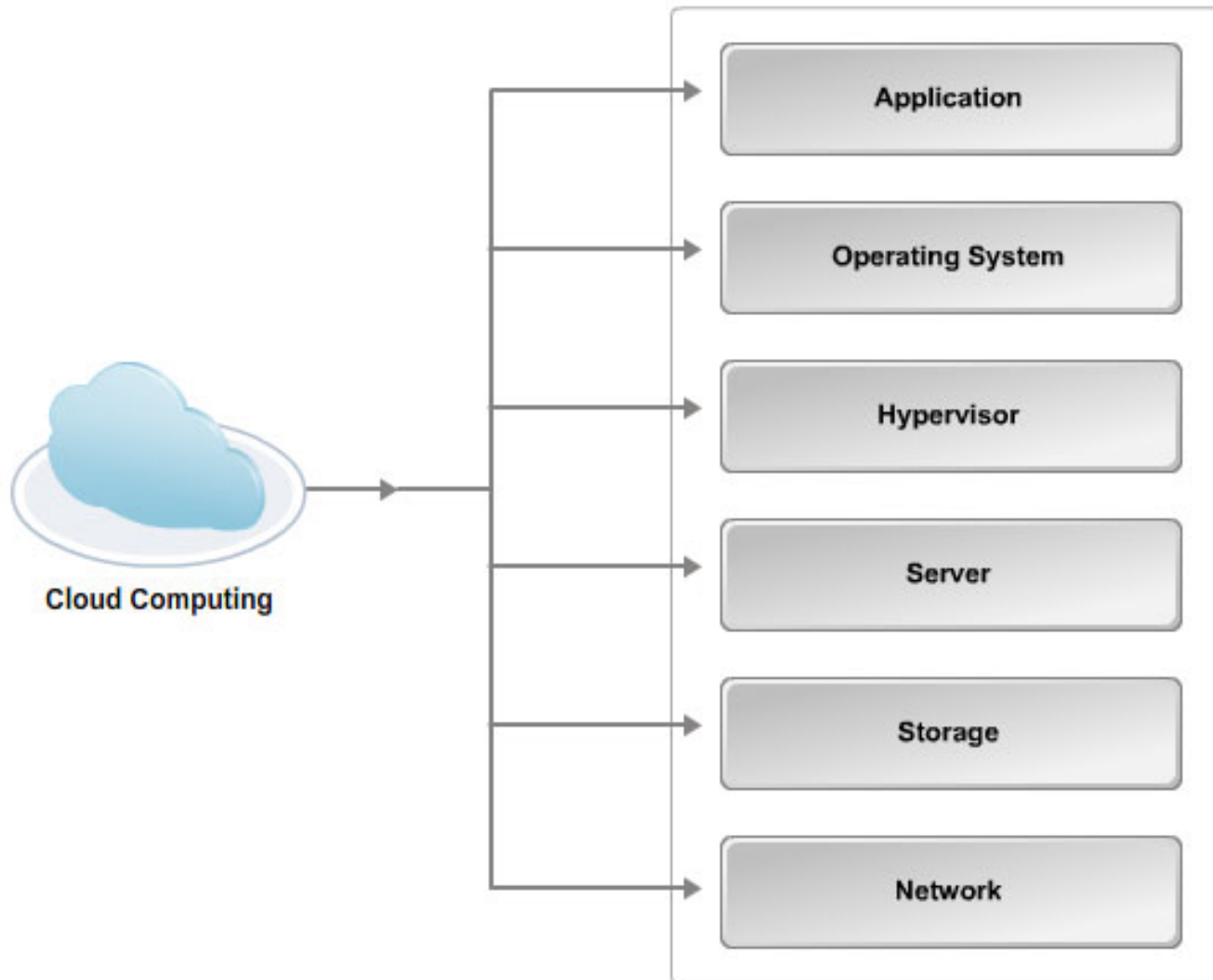




VXLAN

- Vendors such as Intel, VMware, Arista, and Broadcom have developed a technology that creates Layer 2 tunnels, the Virtual Extensible Local Area Network (VXLAN). VXLAN is an example of software-defined cloud networking (SDCN). Fundamentally, VXLAN provides Layer 2 tunneling connections between cloud services separated by Layer 3 network segmentation.

Cloud Network

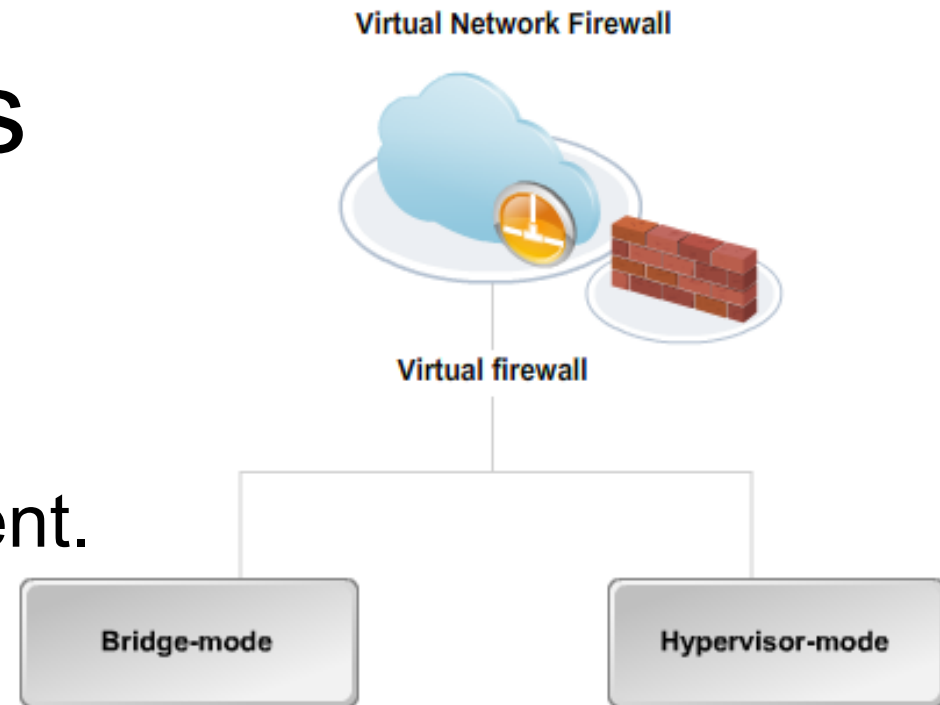


Virtual Firewalls

❑ Virtual firewall is a software, used to monitor and control resources in virtual network environment.

❑ Can operate in bridge mode between VM's inspecting packets from and to different IP addresses

❑ In Hypervisor mode it is built in the hypervisor and captures traffic from virtual machines in order to monitor data





Automation of Operations on Cloud

- ❑ The task of managing and provisioning infrastructure (IaaS), such as servers, network and storage, while centralizing the norms for security and usage
- ❑ The scope of Multi-tenancy (SaaS), which is an added advantage, whereby multiple organizations can not only access an instance of software residing on a server, but also access databases and packaged applications
- ❑ A highly flexible architecture with advanced workload optimization and metering, service assurance, application lifecycle management, security and compliance

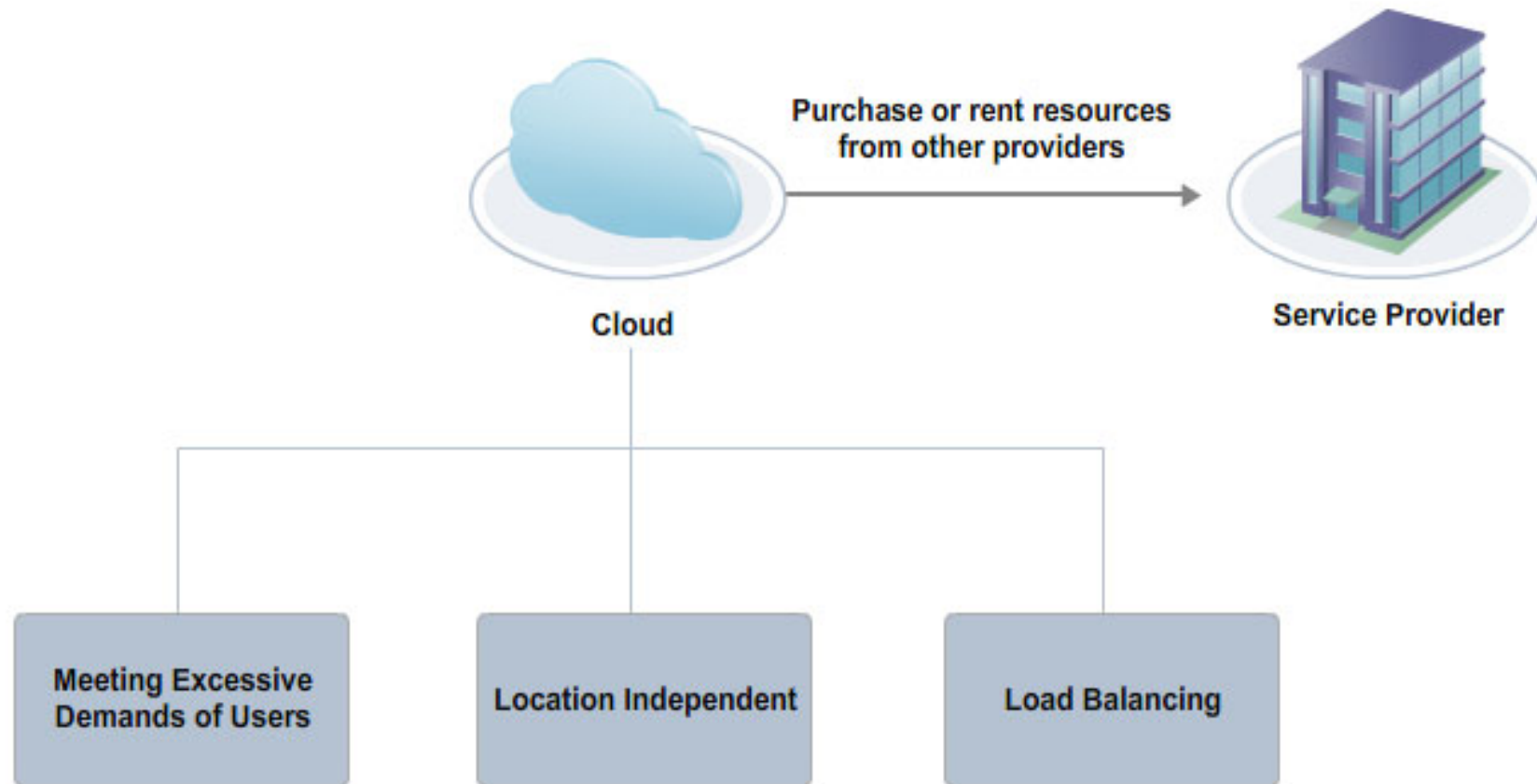
Microsoft Azure IaaS

The screenshot displays the Microsoft Azure portal interface. At the top, the header includes the 'Windows Azure' logo, a 'PREVIEW' badge, and the user's email 'kkhausman@hotmail.com'. The left-hand navigation pane lists various services: 'ALL ITEMS', 'VIRTUAL MACHINES' (0), 'CLOUD SERVICES' (1), 'SQL DATABASES' (5), 'STORAGE' (1), 'NETWORKS' (0), and 'SETTINGS'. The main content area is titled 'virtual machines preview' and contains sub-links for 'VM INSTANCES', 'IMAGES', and 'DISKS'. A message states, 'You have no virtual machines. Create one to get started!', with a 'CREATE A VIRTUAL MACHINE' button.

The 'NEW' modal is open, showing options to create a 'WEB SITE', 'VIRTUAL MACHINE', 'MOBILE SERVICE', 'CLOUD SERVICE', 'SQL DATABASE', 'STORAGE', 'NETWORK', or 'MEDIA SERVICE'. The 'VIRTUAL MACHINE' option is selected, leading to a 'QUICK CREATE' form. The form fields are as follows:

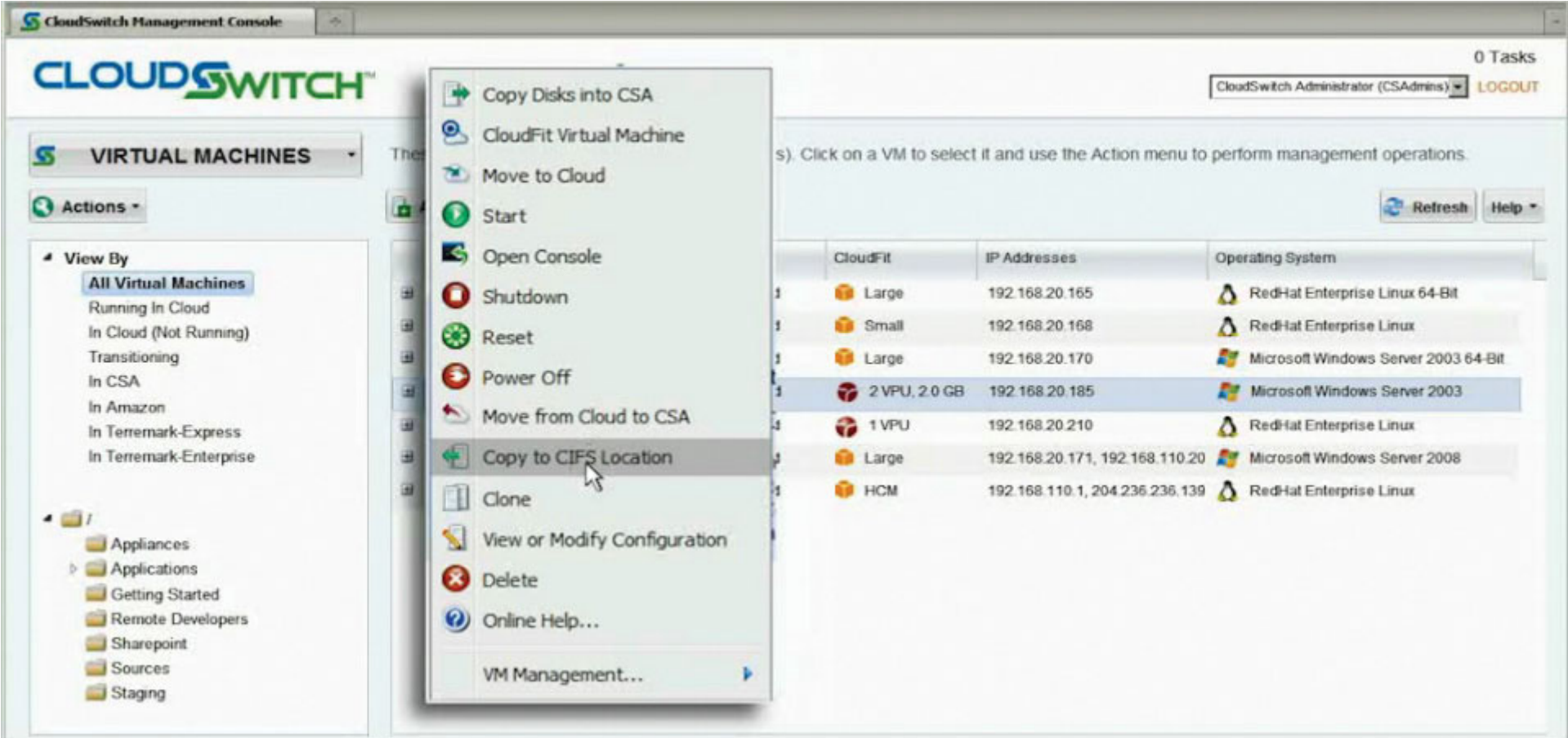
- DNS NAME:** 'cloudessentials' (with a green checkmark) and '.cloudapp.net'.
- IMAGE:** 'Windows Server 2012, August 2012' (selected from a dropdown).
- NEW PASSWORD:** A field with 8 dots.
- CONFIRM PASSWORD:** A field with 8 dots.
- SIZE:** A dropdown menu with the following options:
 - Small (1 core, 1.75 GB Memory)
 - Extra Small (Shared core, 768 MB Memory)
 - Small (1 core, 1.75 GB Memory)
 - Medium (2 cores, 3.5 GB Memory) (highlighted)
 - Large (4 cores, 7 GB Memory)
 - Extra Large (8 cores, 14 GB Memory)

Federated Cloud Services



CloudSwitch

A software appliance that make it possible to migrate services such as cloud-hosted virtual machines between private and public cloud hosting through the same type of web client



The screenshot displays the CloudSwitch Management Console interface. The main content area shows a table of virtual machines with columns for CloudFit, IP Addresses, and Operating System. An action menu is open over the table, listing various management operations. The 'Copy to CIFS Location' option is highlighted by the mouse cursor.

CloudFit	IP Addresses	Operating System
Large	192.168.20.165	RedHat Enterprise Linux 64-Bit
Small	192.168.20.168	RedHat Enterprise Linux
Large	192.168.20.170	Microsoft Windows Server 2003 64-Bit
2 VPU, 2.0 GB	192.168.20.185	Microsoft Windows Server 2003
1 VPU	192.168.20.210	RedHat Enterprise Linux
Large	192.168.20.171, 192.168.110.20	Microsoft Windows Server 2008
HCM	192.168.110.1, 204.236.236.139	RedHat Enterprise Linux

CloudSwitch Management Console

CLOUDSWITCH™

VIRTUAL MACHINES

CloudSwitch Administrator (CSAdmins) LOGOUT

0 Tasks

Refresh Help

Copy Disks into CSA

CloudFit Virtual Machine

Move to Cloud

Start

Open Console

Shutdown

Reset

Power Off

Move from Cloud to CSA

Copy to CIFS Location

Clone

View or Modify Configuration

Delete


Online Help...

VM Management...



Researcher – real life example

- PhD student in Medicine for his PhD thesis has to analyze and render with 3D software hundreds of thousands X-ray images. She has to finish her PhD work in 3 years, and the real analysis and modeling is scheduled for 6 months.
- For the research she needs four servers, each costs about 4000 EUR and a shared storage which costs 7000 EUR – total of 23000 EUR.
- Instead she rented resources from a Bulgarian cloud provider.
- One server with 4 CPUs, 8 GB RAM and 5TB storage costs 0.75 EUR/hour with VAT included. Four servers cost 3 EUR/hour. She worked 6 months X 20 working days X 8 hours per working day X 3 EUR, which totals of 2880 EUR, and now she is a PhD.



Penetration tester – real life examp.

- For effective penetration test you need at least 2000, sometimes 5000 users against one penetrated system.
- One computer may simulate effectively about 100-200.
- So you need 10, sometimes 40-50 powerful computers with stable Internet connection to perform a test.
- Sometimes you need to change the source IP addresses, that is impossible when you test from a fixed location, except if you buy many addresses (already impossible).
- You provide 1 – 2 tests in a month for average 5000\$
- If you own the equipment, you need to invest 50 PC's X 1000\$ = 50000\$, and to pay monthly Internet fee for about 500\$
- In the cloud you need 0.1\$ per machine per hour. One test typically takes about 4 to 8 hours against one server. = 40\$

Cloud.bg (Oblak.bg)

The image shows a configuration interface for cloud infrastructure on Oblak.bg. At the top, the logo "Oblak.bg" is displayed in blue. Below it, the text "ИНФРАСТРУКТУРА (IAAS)" is centered between left and right navigation arrows. The main configuration area is a purple cloud shape containing three vertical sliders for "CPU", "RAM", and "HDD". Below the sliders, the selected values are listed: "4 CPUs", "4 GB", and "1 TB". At the bottom, there are two radio buttons for operating systems: "Linux" (selected) and "Windows". A final line of text at the bottom states "Само за 43 стотинки на час с ДДС."

Oblak.bg

ИНФРАСТРУКТУРА (IAAS)

CPU RAM HDD

4 CPUs 4 GB 1 TB

Linux Windows

Само за 43 стотинки на час с ДДС.